CLAIMS:

1. A regeneration process of an etching solution composed of a phosphoric acid solution and used in etching silicon nitride films in an etch bath, which comprises the following steps:

taking said etching solution out of said etch bath, said etching solution containing a silicon compound formed by said etching, and adding water to said taken-out etching solution to lower a concentration of phosphoric acid in said etching solution to 80 to 50 wt.%; and

removing said silicon compound, which has precipitated in said etching solution by said lowering of said concentration of phosphoric acid, from said etching solution.

2. A regeneration process according to claim 1, wherein said removal of said silicon compound from said etching solution is conducted by filtration.

3. A regeneration process according to claim 1, wherein said concentration of phosphoric acid in said etching solution is lowered to 75 to 50 wt.%.

4. A regeneration process according to claim 1, wherein upon diluting said etching solution, said etching solution is cooled to 100°C to room temperature.

5. A regeneration process according to claim 1, wherein subsequent to said removal of said silicon compound from said

etching solution, said etching solution is heated to 140°C to 180°C.

6. A regeneration process according to claim 1, wherein subsequent to said removal of said silicon compound from said etching solution, said concentration of phosphoric acid in said etching solution is raised to 80 to 90 wt.%.

7. A process for etching silicon nitride films with an etching solution, which is composed of a phosphoric acid solution, in an etch bath, which comprises the following steps:

taking said etching solution out of said etch bath during or after said etching, said etching solution containing a silicon compound;

regenerating said etching solution by a process according to any one of claims 1-6; and

returning said thus-regenerated etching solution to said etch bath.

8. A process for etching silicon nitride films with an etching solution, which is composed of a phosphoric acid solution, in an etch bath, which comprises the following steps:

taking said etching solution out of said etch bath during or after said etching, said etching solution containing a silicon compound;

dividing the taken-out etching solution into two streams;

filtering said etching solution (A) in one of said two streams and returning the thus-filtered etching solution to

said etch bath;

regenerating said etching solution (B) in the other stream by a process according to any one of claims 1-6; and

combining said regenerated etching solution (B) with said filtered etching solution (A), and returning said thus-combined etching solution to said etch bath.

9. An etching system for practicing an etching process according to claim 7 or 8, comprising:

a dilution and precipitation unit for taking said etching solution out of said etch bath, the etching solution containing said silicon compound, and diluting said taken-out etching solution with water to precipitate said silicon compound,

a filtration unit for said silicon compound, and

at least one of a concentration unit and heating unit for said etching solution,

wherein said dilution and precipitation unit, said filtration unit and said at least one of said concentration unit and heating unit are arranged in the order that they are presented.